DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING, NITK – Surathkal

Course Plan and Evaluation Plan
III Sem B.Tech, Odd Sem Sept – Jan 2021

1. Course Code: CS204
2. Course Title : Data Structures and Algorithms Lab
3. L-T-P: 0-0-3
4. Credits: 2 credits
5. Prerequisite: CO111 (Computer Programming lab)
6. Course Instructor : Vani M/ Radhika B S (al.radhika@nitk.edu.in), Moulya D M (al.moulya@nitk.edu.in), Marwa Mohiddin (al.marwamohiddin85@nitk.edu.in)
7. Teaching Department : Computer Science & Engineering
8. Objective of the Course:
   (i) To structure and program data in various implementations like lists, stacks, queues, trees and graphs.
   (ii) To learn and program in different algorithm design techniques like Divide and Conquer, Dynamic Programming etc
   (iii) To implement all the above using C/C++ as a programming language.
9. Course coverage

Data Structures

Arrays
- Array manipulation
- Accessing array elements using pointers
- 2-D arrays

Lists
- Operations on Lists
- Array implementation of Lists
- Pointer implementation of Lists (Linked Lists)
- Doubly Linked Lists
- Circular Linked List

Stacks
- Operations on Stacks
- Array implementation of stacks
- Infix to postfix, postfix to prefix etc

Queues
- Pointer implementation of queues
- Circular array implementation of queues

Trees
- Traversal of trees (inorder, preorder, postorder)
- Binary search tree implementation.
- Min heap and Max heap implementation.

Graphs
- Breadth First Search
- Depth First Search
- Shortest Path Algorithms
- Strongly connected components
- Topological sorting

Algorithms

Sorting: Insertion Sort, Bubble Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort, Bucket Sort

Searching: Linear Search, Binary Search

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. *Data Structures and Algorithms*. Addison Wesley, 1983.

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein. *Introduction to Algorithms*. McGraw-Hill, 2001.

3. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++*, Pearson, 2014.

4. Donald Knuth, *The Art of Computer Programming*, vol. 1. Addison-Wesley, 3rd edition, 1997.

5. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms* (second edition), Universities Press, 2012.

6. D. Samanta, *Classic Data structures*, Prentice Hall, 2004

Evaluation Plan

End Sem Exam	: 40%
Mid Sem Exam	: 25%
Test/Weekly assessment/Viva	: 35%

[Vani M/Radhika B S]

Course Instructors